Sónia Frota, Joseph Butler, Cátia Severino, C. Bandeira de Lima & Marina Vigário

Universidade de Lisboa - Lisbon Baby Lab (CLUL/FLUL), HSM-CHLN / Universidade de Lisboa (CLUL/FLUL)

The European Portuguese MacArthur-Bates CDI Short-forms: assessing language development in longitudinal studies and clinical populations

http://labfon.letras.ulisboa.pt/babylab/pt/CDI/
Introduction

- European Portuguese MacArthur–Bates Communicative Development Inventories short forms (EP-CDI SFs) are a tool specifically designed for the assessment of early language skills and their development in European Portuguese-learning infants and toddlers; population-based norms are available (Frota et al., 2016)

- SFs: wide range of applicability (quick assessment, longitudinal studies, repeated administration, low demands on educational background of families)

- SFs: effective, reliable and valid, more applicable in several research, educational, clinical settings Fenson et al. (2000), Pérez-Pereira & Resches (2007), Jackson-Maldonado et al. (2013)
Infant communicative development assessed with the European Portuguese MacArthur–Bates Communicative Development Inventories short forms
Normative percentile tables with fitted scores by month, for every 5th percentile level from the 5th to the 99th rank > EP-CDI website
http://labfon.letras.ulisboa.pt/babylab/pt/CDI/
Introduction

- **SFs: Predictive value of lexical development**
  - sensitivity of vocabulary growth as a measure of early syntactic development, shown by strong correlation scores (Fenson et al., 2000, 2007; Pérez-Pereira & Resches, 2007)
  - strong correlation between expressive vocabulary and production of complex words (Frota et al., 2016)
  - Early lexical development as an early predictor of delayed language development (e.g., Stolt et al., 2009)
Current study

- Investigates the utility of the CDI SFs
  - To measure early language skills in atypical populations
  - As an early predictor of typical and atypical language development in prospective studies

As ceiling effects were only found at the end of the age range & top half of the distribution (expressive vocabulary), or not found at all (complex words, word combinations) > appropriate for use with at-risk or language-impaired children (even at older ages)
Current study: Ongoing Projects

Typical development  At-Risk for language disorders (ASD, SLI)

Do Olhar ao Cérebro: marcadores precoces no desenvolvimento da linguagem

Eyes and Brain: Early markers of Language development

http://labfon.letras.ulisboa.pt/babylab/EBELa/

Horizon21: Early language development in Down Syndrome

http://labfon.letras.ulisboa.pt/babylab/horizon21/

Horizonte21: Desenvolvimento da linguagem em bebês com Síndrome de Down

PhD Project on Language and Communication Development in ASD
Current study

- **Address two questions**
  - What characterizes the developmental trends in early language skills in at-risk and language-impaired children?
  - How effective is the CDI in identifying language-impaired children and children at-risk for language impairments (also by comparison to the CDI norms)?
Outline

- Methods
  - Participants, Materials & Procedure, Data analysis
- Results 1: Vocabulary sizes, production of complex words, word combinations
- Results 2: Longitudinal data
- Results 3: Vocabulary size relative to CDI norms
- Discussion

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Methods: Participants

- **EBELa**
  - **Typical developing (TD):** 89 children between 8 and 30 months (45 boys); no hearing/visual problems; no known risk for language impairment; CSBS* score indicates development as expected for age.
  - **At-Risk (AR):** 18 children between 9 and 30 months (10 boys); inclusion criteria – at least a close relative with developmental/language disorder (ASD, SLI), n=16; close relative as a late talker+low birth weight (<2,500 g)+premature birth (<37 gestational weeks), n=2; and/or CSBS* score with highest level of concern, n=6.

Landa (2008); Oliveira et al., (2007); Ozonoff et al., (2011); Stanton-Chapman (2002)
Methods: Participants

- **Horizonte21**
  - **Síndrome Down (T21):** 15 children between 9 and 30 months (10 boys); inclusion criteria – no hearing loss to mild impairment, vision screening

  Finestack et al., (2013); Kent & Vorperian (2013); Loane et al. (2013); McDuffie & Abbeduto (2009)

- **PhD Project on Language and Communication Development in ASD:** 19 children, average CA=52 months, range=28 to 76 months (17 boys) with diagnosis (DSM-5, ADI-R, CARS); average mental age (MA)= 33,7 (assessed with Griffiths Mental Scales), range 17 to 52. MA was used.
Methods: Materials & Procedure

- **EBELa and Horizon21**
  - EP-CDI SFs, CSBS-DP* checklist for communication and language developmental profile (adapted for EP by the EBELa team), Griffiths Scales
  - Prospective studies: experimental task (ET, ERP) +CSBS+CDI, and language abilities measured later in intervals of 6 months up to 30 months+ Griffiths final assessment

- **PhD project on ASD**
  - EP-CDI SFs administered twice (12 months interval)

Wetherby & Prizant (2003); GMDS-ER, Portuguese version based on the 2006 edition
Current study

- To use as much data as possible, age groups were established with a fixed range of 3 mos before and after the designated age: 12 (9.5 to 15.5), 18 (15.5 to 21.5), 24 (21.5 to 27.5), 30 (27.5 to 33.5)
- Descriptive statistics, nonparametric statistics to compare between groups at each age and to examine correlations between language measures
- Regression lines to represent longitudinal trends

Wetherby & Prizant (2003); GMDS-ER, Portuguese version based on the 2006 edition
Results 1: Vocabulary sizes

- EP-CDI SFI

Mann Whitney U tests comparing each group at each age: $p < .01^{**}$, $p < .05^{*}$ (only significant comparisons reported)

Significant difference in receptive and expressive lexicon at 12 months, between TD and T21; AR show smaller lexicons than TD and larger than T21.
Results 1: Vocabulary sizes

- EP-CDI SFII

Mann Whitney U tests comparing each group at each age: p < .01 **, p < .05 * (only significant comparisons reported)

- Significant differences in expressive lexicon between groups at **24 and 30 months**; AR differ from TD and T21
- As expected, the power of the CDI to identify children at risk for language delay/impairment increases with age (e.g., Heilmann et al., 2005)
Results 1: Vocabulary sizes

- Expressive lexicon

Expressive lexicon growth shows different patterns across groups, with a substantial gradual increase in TD, a reduced growth at 24 and 30 in AR, and a much smaller lexicon size with no increase at 24 and 30 in T21.
Results 1: Vocabulary sizes

- Expressive lexicon in ASD (MA)

- Assuming that MA closely resembles CA for TD, ASD were compared with TD: Significant difference in expressive lexicon between groups at 30 months
Results 1: Complex word production

- Significant different between TD and T21 at 30 months.
- The growth of complex word production shows a substantial gradual increase for TD (matching the norms – Frota et al., 2016), but not for AR (or T21).

Nearly all the T21 children did not produce complex words.
Results 1: Word combinations

• Significant different between TD and T21 at 30 months.
• The growth of word combinations shows a substantial gradual increase for TD, but not for AR or T21.

Most T21 children did not produce word combinations

Proportion of children producing word combinations
Results 2: Longitudinal data

- The same children at different ages

- Expressive lexicon growth shows again differences across groups, with a substantial gradual increase for TD, a reduced growth for AR (becomes clearer with age), and much smaller lexicon sizes for T21 and ASD (but here MA)
- Again, the power of the CDI to identify the different groups increases with age
Results 3: Vocabulary sizes relative to EP-CDI SFs norms

- Percentage of children falling below percentiles 5th and 10th: Other studies have shown that the CDI was effective in identifying children with low language skills up to the 11th percentile (Heilman et al., 2005 for late talkers; Mervis & Robinson 2000 for DS and Williams syndrome)

12 months: The age point where significant differences in receptive lexicon were detected

Twice as much AR scored below the 5th and 10th p.
Results 3: Vocabulary sizes relative to EP-CDI SFs norms

- Percentage of children falling below percentiles 5th and 10th

12, 24 & 30 months: The age points where significant differences in expressive lexicon were detected

12 and 30 months seem crucial age points to signal AR children
Discussion

Two main questions were addressed

- What characterizes the developmental trends in early language skills in at-risk and language-impaired children?

- AR smaller lexicons then TD and larger than T21
- AR reduced lexicon growth at 24 and 30 months compared to TD, and NO gradual increase in complex word production unlike TD
- T21 smaller lexicon size with No growth at 24 and 30, and hardly produce complex words
Discussion

Two main questions were addressed

- How effective is the CDI in identifying language-impaired children and children at-risk for language impairments (also by comparison to the CDI norms)?

- Significant differences emerged as early as 12 months for language-impaired, and AR scored clearly below the 5th percentile for comprehension and production than TD
- AR showed significant differences in production from both TD and T21 at 24-30 months
- Although the power of the CDI to identify at-risk and language-impaired children increases with age, 12 and 30 months emerged both as critical age points to signal AR children

Limitations: Ongoing study
Sample sizes (effects may not be seen at given ages)
Gender effects (CDI norms)
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labfon@letras.ul.pt

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